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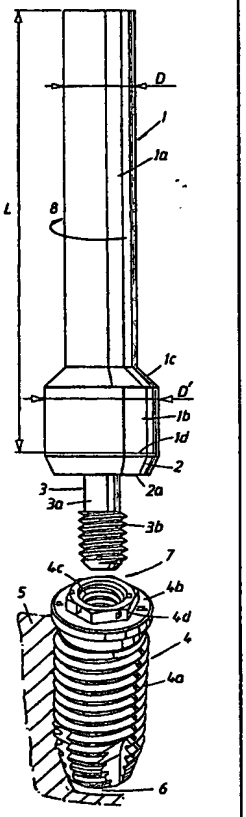
(57) Abstract

A spacer (2) is secured in an implant (4) by means of a screw (3) which extends through the spacer and whose head cooperates with a tightening and locking surface in the spacer. Before the screw is screwed in, the said screw and the spacer are supported by a holder which, together with the spacer and the screw, forms a rotationally fixed unit. The thread of the screw is screwed into the thread (4c) of the implant by means of rotating or screwing movements (8) of the unit. When, during screwing, the bearing surface (2a) of the spacer comes into cooperation with a corresponding top surface of the implant, the holder is removed from the spacer and the screw, after which the screw head is exposed for possible further tightening.



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TITLE

Method, arrangement and use for applying a spacer to an implant by means of a screw

The present invention relates to, inter alia, a method for securing a spacer to a firmly integrated implant, preferably in the jaw bone, by means of a holder and with the aid of a screw. The threaded part of the screw will extend through a recess in the spacer so that its thread cooperates with the thread of the implant. The screw head can moreover cooperate with a tightening and locking surface in the spacer, which also has a bearing surface which can cooperate with a top surface of the implant. The invention also relates to an arrangement for application of this method. The invention relates in addition to the use of the holder for securing a spacer in an implant by means of a screw.

After the implant has become firmly integrated in the bone, which normally takes 3 to 6 months after fitting the fixture or implant, a spacer is attached. In this connection, an incision is made through the gum so that the upper surface of the implant is exposed. Upon attachment of the spacer, which is also called the spacer element, the latter is screwed securely to the implant or fixture. The spacers which are normally used here are made up of an essentially cylindrical component which is to be screwed securely with a loose, separate screw. In the majority of cases, the spacer has an internal hexagon which is intended to match a corresponding external hexagon on the upper part of the implant. There are also spacer designs in which the actual spacer body and the screw have been integrated to form one unit. However, it is advantageous to be able to use screw and spacer as two separate units. The tightening of the screw can then be improved by virtue

of the fact that the frictional torque acting on the screw head is reduced because the contact radius of the screw head is less compared to the case of using separately integrated spacer and screw. In addition, when the screw and spacer form different units, they can be made of different materials. The spacer is preferably made of a tissue-compatible material, for example titanium or a ceramic material. The screw can be made of stronger material and can be coated with a friction-reducing coating so as to obtain an improved prestressing of the screw connection. An alternative here, or complement, is to choose a screw material which itself affords low friction between the thread of the screw and the corresponding internal threading of the implant. Such material can, for example, include certain gold alloys.

In purely general terms, it is relatively difficult to handle small spacer and screw components in or around the oral cavity, for lack of space among other reasons. Various attempts have been made to make handling and securing of spacer and screw easier. For example, a special counterstay has been used which is arranged on the spacer at the same time as a screwdriver is engaged in the groove of the screw head. There are also examples of so-called pre-fitted disposable spacer holders which consist of two mutually movable parts, one of which engages round the screw and the other round the spacer.

In connection with the said known prior art, reference may be made to US Patent Specifications 5,145,371, 5,322,443, 5,462,436, 5,437,550 and 5,692,904.

There is in general a great need to be able to handle small spacer and screw components in accordance with the above. In this context, it is important to be able to make available methods, arrangements and uses which are technically simple to implement and to use. Thus, for example, problems arise when using special

counterstays which are arranged on the spacer, since the support capacity is relatively poor and the components are not pre-assembled but are applied by the operators or their assistants during the operation. Using holders with mutually movable parts represents a technically complicated and awkward solution which is not compatible with practical handling and use.

The object of the invention is, inter alia, to solve these problems, and the feature which can principally be regarded as characterizing a method according to the invention is that the screw, in its position passing through the spacer, and the said spacer are first held together in a rotationally fixed manner in the holder, so that the bearing surface of the spacer protrudes beyond the holder, and the threaded part of the screw in turn protrudes beyond the bearing surface. Further features are that the rotationally fixed unit thus established by the holder, the spacer and the screw is thereafter applied to the implant in a position of cooperation of the threads of the implant and screw. The unit is then given rotating movements, during which the thread of the screw is screwed down into the thread of the implant. At a predetermined position of screwing, preferably where the cooperation between the bearing surface of the spacer and the top surface of the implant has been established, the holder is separated or detached from the spacer and the screw by means of a separating movement, for example a deflecting movement, which is preferably distinct from the rotating movement. The screw head is exposed for possible further tightening.

In one embodiment, the novel method is characterized by the fact that in order to achieve the holding function for holder, spacer and screw to form a common rotationally fixed unit, the screw is applied in the spacer to a position where its head bears against the aforementioned tightening and locking surface of the spacer, and by the fact that the spacer and screw

thus combined are thereafter pressed into an end recess in the holder, or the holder is pressed over the spacer and the screw via the said recess. In one embodiment, the holder works with an elastic and/or spring function and/or snap-in function, by means of which the spacer and the screw, in their coupled positions, are locked to the holder in the direction of rotation. While it is being screwed in, the spacer is preferably brought into cooperation with the top surface of the implant only via an annular end surface, i.e. hexagonal or other types of effective, rotation-fixing surfaces are not present in this illustrative embodiment.

The feature which can principally be regarded as characterizing an arrangement according to the invention is that before the screw is introduced into the thread of the implant, the holder supports the screw in its position passing through the spacer and supports the spacer in a rotationally fixed manner, with the bearing surface of the spacer protruding beyond the holder, and the threaded part of the screw protruding beyond the bearing surface. Further characteristics are that a rotationally fixed unit thus established by the holder, the spacer and the screw can be applied to the implant in a position of cooperation between the threads of the implant and of the screw, where screwing of the screw thread into the implant thread can be effected by means of rotating or screwing movements of the unit. A further characteristic is that the holder, in a possible screwing position, preferably where the bearing surface of the spacer cooperates with the top surface of the implant, is arranged to be separable from the spacer and the screw by means of separating movements which are preferably distinct from the rotating movement, whereupon the screw head is exposed for possible further tightening. The said separation can be effected by means of the deflection function in the holder (the present holder part).

In one embodiment of the novel arrangement, the

holder, at least in its part which can cooperate with the spacer and the screw, is made of plastic or other elastic material. The spacer and the screw, in the said coupled position, can be applied in an end recess in the said holder part receiving the screw and the spacer via a function preventing reciprocal rotating movements between spacer, screw and holder, which can be obtained from guide surfaces, a spring function, snap-in function, etc. In a further embodiment, the holder or holder part is provided with a first recess for the screw head and a second recess for securing parts on the spacer. The holder can be applied on the securing part and the screw head and secures the spacer and the screw by means of the in-built spring function and/or elasticity in the wall-supporting material of the first and second recesses, possibly in combination with a snap-in function. The holder can consist of or comprises an elongate element made of plastic or equivalent material. The holder is comparatively easily separable from the spacer and the screw, in their position applied in or firmly screwed to the implant, by means of a withdrawal movement or withdrawal movements essentially coinciding with the longitudinal direction of the implant or with a tilting movement, in which the holder disengages (for example springs aside) from the said securing part and head on the spacer or the screw. In a further embodiment, the spacer can be provided with an annular bearing surface without internal guide surfaces, for example internal guide surfaces in the form of square or hexagonal or polygonal surfaces. The holder and its attachment to the spacer and the screw can further be arranged to permit a first anchoring contact between the top surface of the implant and the bearing surface of the spacer which eliminates the risk of loosening of the implant in the bone (dentine). After the holder is detached from the spacer and the screw, the latter can be tightened for obtaining a second anchoring contact

which is effected with a force which considerably exceeds the force for the first anchoring contact. The secondary tightening function is effected in a manner known per se with a screwdriver of conventional type in this context. For the second anchoring contact, a counterstay function in the spacer can be used. For this, a tool is used which retains the spacer in a defined angular position while the screw is acted upon by the screwdriver or equivalent. The thread of the screw can be made of relatively strong material and/or coated with a friction-reducing coating for the purpose of improving the anchoring stress between spacer, screw and implant.

The thread diameter of the screw can be chosen such that it is substantially less than the diameter of the bearing surface. For example, the thread diameter of the screw can be half the diameter (mean diameter) of the bearing surface. By choosing the diameter of the screw thread and the diameter of the bearing surface and by choosing low-friction material and/or low-friction coating, the coefficient of friction is substantially lower, for example half as great at the thread as it is at the bearing surface. This means that a secure counterstay (i.e. no risk of loosening of the implant relative to the dentine) can be applied against the outside of the spacer in conjunction with the secondary tightening, despite the absence of mechanical locking via active locking surfaces between spacers and implant.

An arrangement can principally be characterized by the fact that the holder supports the spacer and the screw in a rotationally fixed manner, with the bearing surface of the space protruding beyond the holder, and with the screw extending through the spacer and protruding beyond the bearing surface via its threaded part.

The holder is preferably designed with an end recess or end recesses in which the spacer and the

screw head are pressed and held by the spring function and/or the elasticity of the holder and possibly the snap-in function. Together with the spacer and the screw, the holder forms a rotationally fixed unit which facilitates the application to the implant and the handling and delivery of the spacer and the screw.

A use according to the invention can principally be regarded as being characterized by the fact that the holder used is an elongate element which supports the spacer and the screw in their coupled position in a rotationally fixed manner, with the bearing surface of the spacer against the implant protruding beyond the holder, and the threaded part of the screw in its turn protruding beyond the bearing surface.

Further refinements of the use are characterized in that a resilient and/or elastic part of the holder is used for gripping around and securing the spacer and the screw in rotationally fixed positions in relation to the holder and to each other. The holder can also be used for transmitting manual rotational movements to the screw as the latter is screwed into the implant, i.e. as a shaft.

By means of what has been proposed above, a number of advantages are obtained which solve, inter alia, the problems set out by way of introduction. The spacer and the spacer screw can be joined together with a holder made, for example, of plastic which is clamped by means of the spring function in the holder part or snapped securely on the spacer and the screw so that these three components are held together in a simple manner. The underside of the spacer can be designed without the hexagonal socket which is generally used in this context. The underside of the spacer can thus be designed as a recess of circular cross section, which renders production much less expensive. This means that the spacer element can be rotated down to the correct position on the fixture in a much simpler way compared

to what was possible previously. The advantages of the present invention are primarily that it is now necessary to handle just one element, which can be easily designed to facilitate handling of spacer and screw as such. In addition, it is no longer necessary to depend on the spacer having to assume a rotationally correct position with respect to the implant. The holder can easily be removed and the final tightening made. If so required, a counterstay can be applied during tightening. This is often essential in order not to unnecessarily load the interface between bone and fixture so that the fixture risks being dislodged from its position. On first analysis, one may be led to believe that tightening with a counterstay is not possible because of the lack of rotational locking using hexagons or other polygons. More detailed analysis reveals that as long as the available frictional torque between fixture and spacer is greater than the frictional torque acting on the implant via the screw, i.e. the so-called thread torque, a counterstay can be applied to the spacer. The frictional torque which is transmitted to the fixture on the spacer screw depends on the tensile force in the screw, the diameter of the screw and the coefficient of friction between the screw thread and the internal thread of the fixture. The counterstay torque which can be applied depends on the clamping force between spacer and fixture which is the same as the tensile force of the screw, the diameter of the bearing surface and the coefficient of friction between the spacer and the top surface of the fixture.

Presently proposed embodiments of the method, arrangement and use having the characteristics of the invention will be described below with reference to the attached drawings, in which:

Figure 1 shows, in a side view and partial perspective view, the holder, spacer and screw in relation to an implant,

Figure 2 shows a longitudinal section through the holder, spacer and screw, in the assembled position,

Figure 3 shows a side view of the holder, screw and spacer, in the disassembled position,

Figures 4 and 4a are perspective views of the spacer, viewed obliquely from below and from above, respectively, and

Figures 5 to 6 show part of the holder in longitudinal section and enlarged.

DETAILED EMBODIMENT

In Figure 1, a holder is indicated by 1. The holder comprises an elongate part 1a and a widened part 1b arranged on the elongate part. The holder can be made of plastic material, the part 1a can be a substantially solid part and the part 1b has an end recess, in accordance with what is described below. The holder has a length L of about 20 mm and a diameter D of about 3 mm in part 1a. The part 1b has a diameter D' of about 5 mm. The parts merge into each other via a bevel 1c. Applied to the holder in a rotationally fixed manner there is a spacer 2 which protrudes beyond the end surface 1d of the holder via a part which has a bearing surface 2a. In accordance with what is described below, a screw is applied to the holder and extends through a recess in the spacer so that its threaded part protrudes beyond the bearing surface 2a. The screw is indicated by 3 and the threaded part of the screw by 3a, while the thread itself is indicated by 3b. Figure 1 also shows an implant or fixture 4 which has become firmly integrated in a bone, preferably in a symbolically indicated dentine 5. The implant or the fixture can be of a type known per se and has one or more external threads 4a. The implant is screwed into a hole 6 formed in the bone. The implant is also provided with a top surface 4b against which

the bearing surface 2a of the spacer is intended to bear when the spacer has been screwed into the implant by means of the screw 3. The implant also has an internal thread 4c with which the thread 3b of the screw can be screwed. The implant is also provided with a hexagon, by means of which the implant can be screwed down into the hole 6 formed in the dentine 5. Figure 1 shows a position 7 in which the holder has been moved into position near the implant for cooperation between the threads 3b and 4c.

In accordance with Figure 2, the spacer can be designed in a manner known per se. Thus, a bearing part 2b is included for the head 3c of the screw. The bearing recess of the part 2b for the screw head 3c is indicated by 2c. At the screw head 3c, the screw is also provided with a projecting flange or tabs 3d which cooperate with a top surface 2d of the spacer element. The part 1b of the holder is provided with an end recess 1e. The spacer 2 is introduced into this recess 1e. At the lower end, the spacer has a recess 2e. The end part 1b also has a second recess 1f in which the upper part of the screw head is introduced. The part 1b is also provided with an inwardly directed flange 1g or flange parts which can cooperate with the outside of the spacer part 2a. The spacer part 2a and the said inwardly projecting flange/flange parts are chosen so as to give a rotationally fixed anchoring for the spacer 2 in the part 1b. The recess 1f is chosen with a diameter dimension or a corresponding dimension in relation to a part 3e of the screw which projects into the recess 1f so as to give a rotationally fixed function. The recess 1f can be cylindrical or has a polygonal shape corresponding to the shape of the screw at the said inserted part 3e. The arrangement is thus such that both the spacer and the screw are given a rotationally fixed anchoring in the holder 1.

Figures 1 and 2 thus show that the holder with spacer and screw can be moved into a position of

cooperation 7 with the implant such that the thread 3b engages in the internal thread 4c. The holder can thereafter be given rotating movements 8 which function as screwing movement for the screw 3 into the implant 1 via the threads 3b and 4c. By virtue of the fact that the spacer 2 and the screw 3 are rotationally fixed in the holder 1, screwing down can continue until the lower bearing surface 2a of the spacer contacts the upper bearing surface 4b of the implant. The securing function can be designed such that the force of the rotating movement 8 is maximized and such that the screw and the spacer slip in relation to the holder when this force reaches a certain value. Risks of loosening of the implant 4 in the bone 5 with the unit are thereby eliminated. The anchoring arrangement for the spacer 2 and the screw 3 in the holder is also such that when the screw 3 has been completely or partially threaded down into the implant, the holder can be released from the completely or partially inserted screw, and the spacer fixed loosely or firmly to the screw in the longitudinal direction with a loosening force F which essentially coincides with the longitudinal axis 1h of the holder and/or with an angle of rotational force F' upon whose application the holder disengages from the spacer and the screw by deflection of the holder material. The screw head 3c is thus exposed so that the groove 3f becomes accessible for another tool, for example a conventional screwdriver.

After the holder has been released, it can be discarded. Production of the holder is relatively inexpensive by virtue of the plastic material chosen. Only part of the holder needs to be made of plastic material, i.e. the part 1b which is intended to exert elasticity movements in the securing function for the screw and the spacer. The remainder of the holder can consist of re-usable material, and known joining members can be used between the parts 1a and 1b.

Figure 3 shows the holder 1 and the spacer 2 and the screw 3 in separate positions. Upon assembly of spacer and screw in the holder (or vice versa), the screw and the spacer are joined in the position shown in Figure 2, after which application to the holder or application of the holder to spacer and screw is effected. Holder, spacer and screw are preferably supplied in the state shown in Figure 1. When screwing into the implant is effected using the holder, the latter is removed and discarded or re-used partially as described above. In Figure 3, the member 3d' fixing the longitudinal direction has the form of a solid flange extending around the screw head. Figure 3 also shows indents 2f and 2g on the spacer element, which indents can cooperate with the inwardly projecting flange 1g (Figure 2) for forming nibs or snap-locking members included in the function for fixing the angle of rotation. Figure 4 shows the annular bearing surface 2a in its entirety on the spacer 2. Figure 4 also shows the absence of internal hexagon. Such an internal hexagon normally cooperates with the hexagon 4d of the implant (cf. Figure 1). Such a hexagon or equivalent is not relevant in the present case for the reasons set out above. In Figure 4, a counterstay function is also indicated by 9, which counterstay function can be activated when the screw 3 is being tightened.

In Figures 4a and 5, the snap-in function between spacer and holder is shown in greater detail. The indents on the spacer 2 are represented by the indents 2f and 2g. In the illustrative embodiment shown, there are six such recesses. The flange 1g which is shown enlarged in Figure 5 in relation to the spacer 2 in Figure 4a can thus be made to snap down into the indents after a deflection force F'' has been added to a radial deflection movement in the same direction as the application force. When the flange 1g has snapped down into the indents, the surfaces 1d and 2d on the holder 1b and spacer 2, respectively, bear on each

other. The parts 2h above the indents form nibs or snap-in members for the said flange 1g.

Figures 5 and 6 show the holder parts 1a and 1b and the recesses 1e and 1f. A radial annular surface is also indicated by 1h, which is essentially parallel to the annular end surface 1d. The surface 1h merges into the flange 1g. The wall of the recess 1f is indicated by 1k. The recesses 1e and 1f are cylindrical in the example shown.

The invention is not limited to the embodiment shown above by way of example, but can be modified within the scope of the attached patent claims and the inventive concept.

PATENT CLAIMS

1. Method for securing a spacer (2) to a firmly integrated implant (4), preferably in the jaw bone (5), by means of a holder (1) and by means of a screw whose threaded part will extend through a recess in the spacer so that its thread cooperates with the thread (4c) of the implant, and whose head can cooperate with a tightening and locking surface in the spacer, which also has a bearing surface which can cooperate with a top surface of the implant, characterized in that the screw (3), in its position passing through the spacer, and the said spacer (2) are first held together in a rotationally fixed manner in the holder (1), with the bearing surface of the spacer protruding beyond the holder, and the threaded part protruding beyond the bearing surface, in that the rotationally fixed unit thus established by the holder, the spacer and the screw is applied to the implant in the position of cooperation (7) of the said threads and the unit is given rotating movements (8) during which the thread of the screw is screwed down into the thread of the implant, and in that at a predetermined position of screwing, preferably where the cooperation between the bearing surface of the spacer and the top surface (4b) of the implant is established, the holder is separated from the spacer and the screw by means of movement(s) which is (are) preferably distinct from the rotating movement, whereupon the screw head is exposed for possible further tightening.

2. Method according to Patent Claim 1, characterized in that to achieve the holding function between holder (1), spacer (2) and screw (3) to form a common rotationally fixed unit, the screw is applied in the spacer to a position where its head (3c) bears against the tightening and locking surface (2d) of the spacer, and in that the spacer and screw thus combined

are applied in an end recess (1e, 1f) in the holder or the holder is pressed over the spacer and the screw for obtaining the rotationally fixed function.

3. Method according to Patent Claim 2, characterized in that the holder works with an elastic and/or spring function and/or snap-in function, by means of which the spacer and the screw, in their coupled position, are locked to the holder in the direction of rotation.

4. Method according to Patent Claim 2, characterized in that the spacer, while being screwed in by means of the screw, is brought into cooperation with the top surface (4b) of the implant only via an annular end surface (2a).

5. Arrangement with holder (1) for arranging a spacer on a firmly integrated implant (4), preferably in the jaw bone (5), by means of a screw (3) whose threaded part (3a) will extend through a recess in the spacer so that its thread cooperates with the thread (4c) of the implant, and whose head can cooperate with a tightening and locking surface in the spacer, which also has a bearing surface (2a) which can cooperate with a top surface of the implant, characterized in that before the screw is introduced into the thread of the implant, the holder supports the screw in its position passing through the spacer, and supports the spacer in a rotationally fixed manner, with the bearing surface of the spacer protruding beyond the holder (1), and the threaded part of the screw protruding beyond the bearing surface, and in that a rotationally fixed unit thus established by the holder, the spacer and the screw can be applied to the implant in a position of cooperation between the threads of the implant and of the screw, where screwing of the screw thread into the implant thread can be effected by means of a rotating or screwing movement (8) of the unit, and in that the holder, in a given screwing position, preferably where the bearing surface (2a) of the spacer cooperates with

the top surface of the implant, is arranged to be separable from the spacer and the screw by means of a separating movement which is preferably distinct from the rotating movement, whereupon the screw head is exposed for possible further tightening.

6. Arrangement according to Patent Claim 5, characterized in that, at least in its part (1b) which can cooperate with the spacer and the screw, the holder is made of plastic or other elastic and/or resilient material, and in that the screw and the spacer, in the said coupled position, can be applied in an end recess (1e, 1f) in the said holder part (1b) receiving the screw and the spacer via a function preventing reciprocal rotating movements between spacer, screw and holder, obtained, for example, from clamping or spring function and/or guide surfaces and/or snap-in function, etc.

7. Arrangement according to Patent Claim 5 or 6, characterized in that the holder or holder part (1b) is provided with a first recess (1f) for the screw head and a second recess (1e) for one or more securing parts (1g) on the spacer, and the holder can be applied on the securing part or securing parts and the screw head and secures the spacer and the screw by means of elasticity or resilience in the wall-supporting material of the first and second recesses.

8. Arrangement according to any of Patent Claims 5 to 7, characterized in that the holder consists of or comprises an elongate part (1a, 1b) made of plastic or equivalent material.

9. Arrangement according to any of Patent Claims 5 to 8, characterized in that the holder is comparatively easily separable from the spacer and the screw, in their position applied in or firmly screwed to the implant, by means of a withdrawal movement which essentially coincides with the longitudinal direction (1h) of the implant or with a rotating movement which is distinct from the screwing movement.

10. Arrangement according to any of Patent Claims 5 to 9, characterized in that the spacer is provided with an annular bearing surface (2a) without internal guide surfaces, for example guide surfaces in the form of squares or hexagonal surfaces.

11. Arrangement according to any of Patent Claims 5 to 10, characterized in that the holder and its attachment to the spacer and the screw are arranged to permit a first anchoring contact between the top surface of the implant and the bearing surface of the spacer which eliminates the risk of loosening of the implant in the bone (5), and, after the holder has been removed, the screw can be tightened to obtain a second anchoring contact which is effected with a force which considerably exceeds the force for the first anchoring contact.

12. Arrangement according to Patent Claim 11, characterized in that the second anchoring contact is effected by means of a counterstay function in the spacer.

13. Arrangement according to any of Patent Claims 5 to 12, characterized in that the thread of the screw is made of relatively strong material and/or is coated with a friction-reducing coating for the purpose of improving the anchoring stress between spacer, screw and implant.

14. Arrangement according to any of Patent Claims 5 to 13, characterized in that the thread diameter of the screw is substantially less than the diameter of the bearing surface and is, for example, half the last-mentioned diameter.

15. Arrangement according to Patent Claim 14, characterized in that by choosing the diameter of the screw thread and the diameter of the bearing surface and by choosing low-friction material and/or low-friction coating, the coefficient of friction is substantially lower, for example half as great, at the thread as it is at the bearing surface, which means

that a secure counterstay can be applied against the outside of the spacer upon further tightening, despite the absence of mechanical locking via active locking surfaces between the spacer and the implant.

16. Arrangement of a spacer (2) and a tightening screw (3) for an implant (4) for bone, preferably dentine (5), and a holder for the spacer and screw for facilitating application of the spacer and screw to the implant, characterized in that the holder supports the spacer and the screw in a rotationally fixed manner, with the bearing surface (2a) of the spacer, which is intended to bear against a top surface of the implant, protruding beyond the holder, and with the screw extending through the spacer and protruding beyond the bearing surface via its threaded part.

17. Arrangement according to Patent Claim 16, characterized in that the holder is designed with an end recess for the spacer and the screw head.

18. Arrangement according to Patent Claim 16 or 17, characterized in that the spacer and the screw head assume rotationally fixed positions in the holder by virtue of the fact that the latter is made of resilient and/or elastic material at least at the said recess, and the holder with resilient and/or elastic function cooperates with the spacer and the screw head.

19. Arrangement according to Patent Claim 16, 17 or 18, characterized in that the rotationally fixed attachment is also effected by a snap-in function and in that, for example, the spacer is designed with nibs and/or indents (2f, 2g) for the said snap-in function.

20. Arrangement according to any of Patent Claims 16 to 19, characterized in that, when the spacer and screw are positioned on the implant, the holder can be separated from the spacer and the screw head for longitudinal displacement in the longitudinal direction of the implant and/or a tilting movement.

21. Arrangement according to any of Patent Claims 16 to 20, characterized in that the holder, the spacer

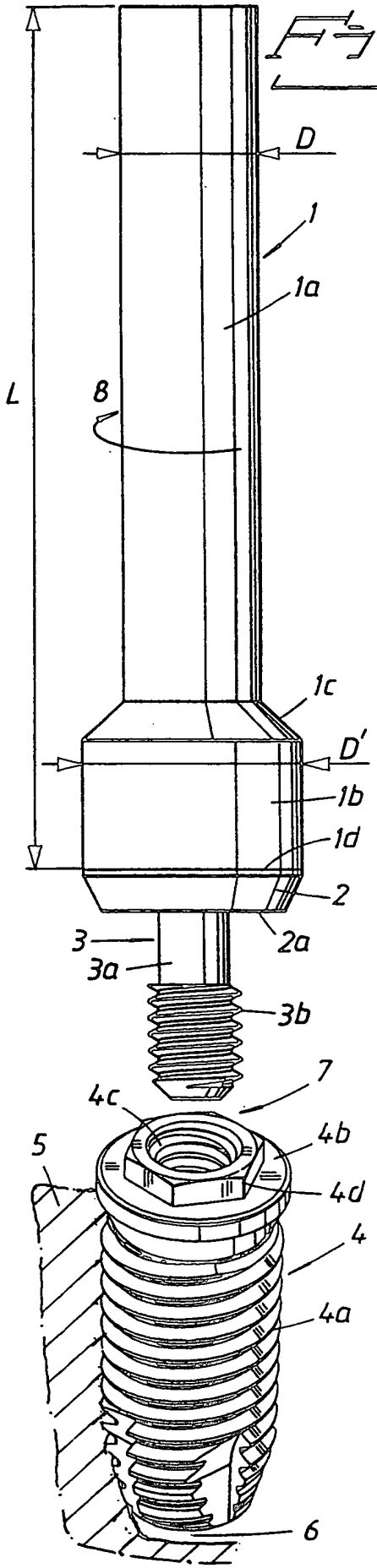
and the screw form a rotationally fixed unit, by means of which the thread of the screw can be screwed into the thread of the implant by screwing movements.

22. Use of a holder (1) for securing a spacer (2) with a screw (3) in an implant (4), characterized in that the holder (1) used is an elongate element which supports the spacer and the screw in their coupled state in a rotationally fixed manner, with the bearing surface (2a) of the spacer against the corresponding bearing surface (4b) of the implant protruding beyond the holder, and the threaded part (3a) of the screw protruding beyond the bearing surface (2a).

23. Use according to Patent Claim 22, characterized in that a resilient and/or elastic part (1b) of the holder is used for gripping around and securing the spacer and the screw in rotationally fixed positions in relation to each other and to the holder.

24. Use according to Patent Claim 22 or 23, characterized in that the holder is used for transmitting manual rotation movements to the screw as the latter is screwed into the implant.

Fig. 1


D
1
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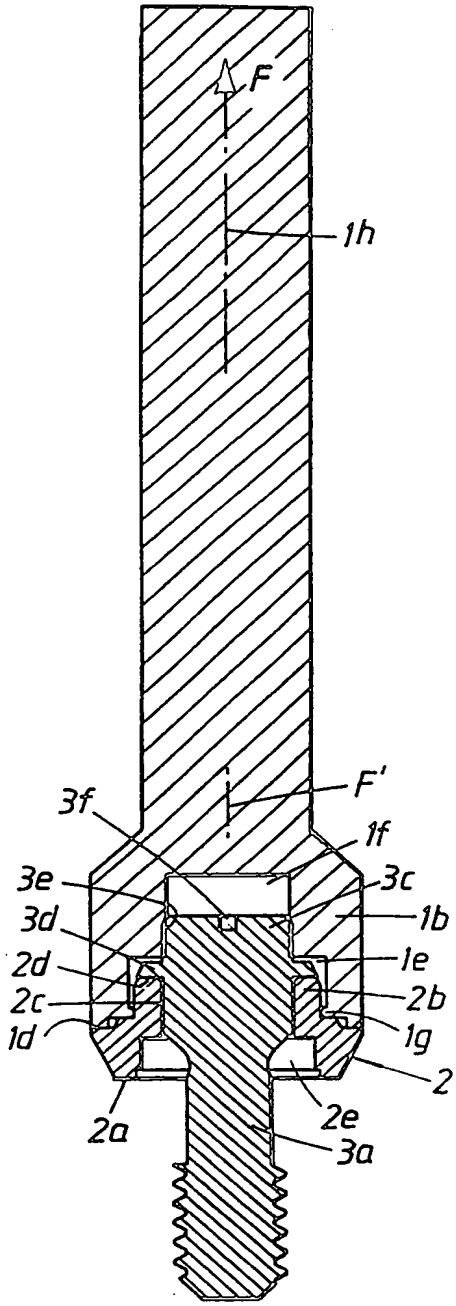
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Fig. 2

Fig. 3

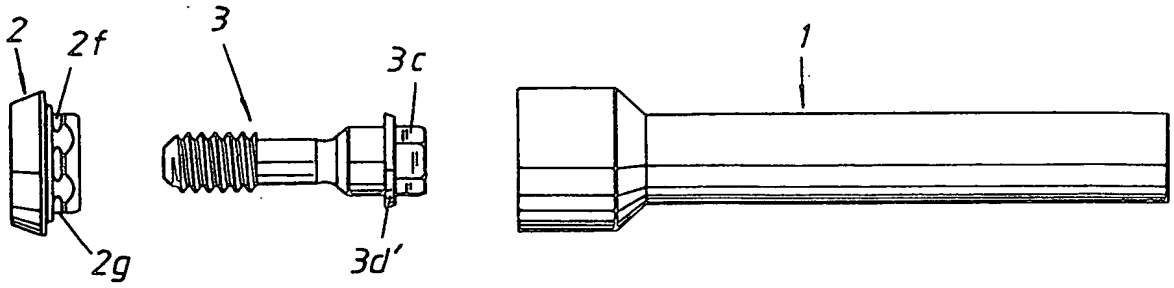


Fig. 4

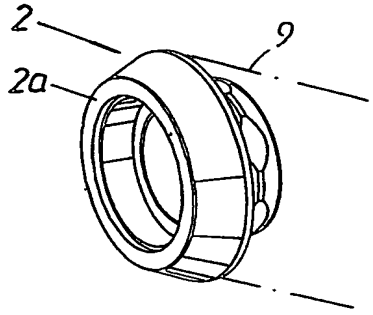


Fig. 4a

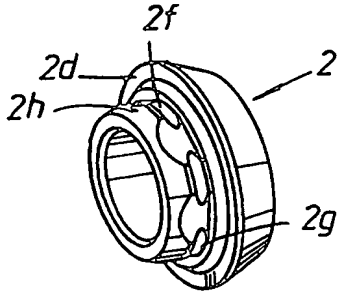


Fig. 5

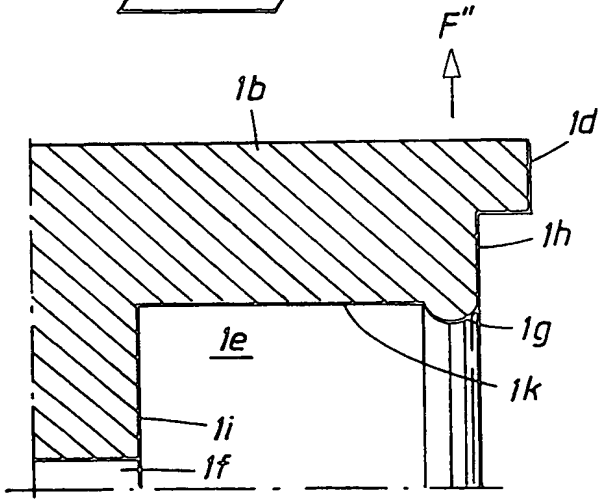
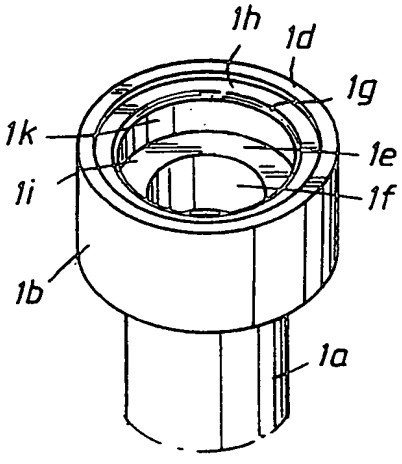


Fig. 6



INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 00/00359

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: A61C 8/00
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: A61C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0419431 A1 (NOBELPHARMA AB), 27 March 1991 (27.03.91) --	1-24
A	WO 9524163 A1 (IMPLANT INNOVATIONS, INC.), 14 Sept 1995 (14.09.95) --	1-24

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" erlier document but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
20 July 2000	2000-07-25
Name and mailing address of the ISA: Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Authorized officer Jack Hedlund / MRO Telephone No. +46 8 782 25 00

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/SE 00/00359

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0419431 A1	27/03/91	AT 93705 T	15/09/93
		CA 2025457 A,C	16/03/91
		DE 69003062 D,T	20/01/94
		DK 419431 T	10/01/94
		ES 2043348 T	16/12/93
		JP 2639420 B	13/08/97
		JP 3121065 A	23/05/91
		SE 463392 B,C	19/11/90
		SE 8903038 A	19/11/90
		US 5145371 A	08/09/92
WO 9524163 A1	14/09/95	AU 1989095 A	25/09/95
		BR 9506920 A	30/09/97
		EP 0748188 A	18/12/96
		JP 9510124 T	14/10/97
		US 5437550 A	01/08/95
		US 5692904 A	02/12/97

09/936722

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

14

Applicant's or agent's file reference 4109 PCT	**FOR FURTHER ACTION**	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/SE00/00359	International filing date *(day/month/year)* 24.02.2000	Priority date *(day/month/year)* 18.03.1999
International Patent Classification (IPC) or national classification and IPC7 A 61 C 8/00		
Applicant Nobel Biocare AB (publ) et al		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 3 sheets, including this cover sheet.

   ☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of _____ sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the report
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - VI ☐ Certain documents cited
   - VII ☐ Certain defects in the international application
   - VIII ☐ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
12.09.2000	20.08.2001
Name and mailing address of the IPEA/SE Patent- och registreringsverket Box 5055 S-102 42 STOCKHOLM Telex 17978 PATOREG-S Facsimile No. 08-667 72 88	Authorized officer Jack Hedlund/Els Telephone No. 08-782 25 00

Form PCT/IPEA/409 (cover sheet) (January 1998)

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/SE00/00359

I. Basis of the report

1. With regard to the **elements** of the international application:*

☒ the international application as originally filed

☐ the description:
pages _____, as originally filed
pages _____, filed with the demand
pages _____, filed with the letter of _____

☐ the claims:
pages _____, as originally filed
pages _____, as amended (together with any statement) under article 19
pages _____, filed with the demand
pages _____, filed with the letter of _____

☐ the drawings:
pages _____, as originally filed
pages _____, filed with the demand
pages _____, filed with the letter of _____

☐ the sequence listing part of the description:
pages _____, as originally filed
pages _____, filed with the demand
pages _____, filed with the letter of _____

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.
These elements were available or furnished to this Authority in the following language english which is:

☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).

☒ the language of publication of the international application (under Rule 48.3(b)).

☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:

☐ the description, pages _____

☐ the claims, Nos. _____

☐ the drawings, sheet/fig _____

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2 (c)).**

* *Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).*

** *Any replacement sheet containing such amendments must be referred to under item I and annexed to this report.*

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/SE00/00359

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-24	YES
	Claims		NO
Inventive step (IS)	Claims	1-24	YES
	Claims		NO
Industrial applicability (IA)	Claims	1-24	YES
	Claims		NO

2. Citations and explanations (Rule 70.7)

The documents cited in the International Search Report represent the prior art. The claimed invention stated in claims 1 - 24 is not considered to be anticipated by these documents. None of the documents or any relevant combination of them reveal a method, an arrangement and a use for applying a spacer to an implant by means of a screw as described by these claims.

Consequently, the cited documents only disclose the general state of the art, which is not considered to be of particular relevance. Therefore, the claimed invention differs from what is disclosed in the cited documents and is considered to fulfil the requirements of novelty, inventive step and industrial applicability.

WO 00/54697
PCT/SE00/00359

PATENT COOPERATION TREATY

PCT 2000-09-29

From the INTERNATIONAL BUREAU

To:
OLSSON, Gunnar
Nobel Biocare AB (publ)
Box 5190
S-402 26 Göteborg
SUÈDE

NOTICE INFORMING THE APPLICANT OF THE COMMUNICATION OF THE INTERNATIONAL APPLICATION TO THE DESIGNATED OFFICES

(PCT Rule 47.1(c), first sentence)

Date of mailing (day/month/year) 21 September 2000 (21.09.00)	
Applicant's or agent's file reference 4109 PCT	**IMPORTANT NOTICE**
International application No. PCT/SE00/00359	**International filing date** (day/month/year) 24 February 2000 (24.02.00)
Priority date (day/month/year) 18 March 1999 (18.03.99)	
Applicant NOBEL BIOCARE AB (publ) et al	

1. Notice is hereby given that the International Bureau has communicated, as provided in Article 20, the international application to the following designated Offices on the date indicated above as the date of mailing of this Notice:
   AU,KP,KR,US

   In accordance with Rule 47.1(c), third sentence, those Offices will accept the present Notice as conclusive evidence that the communication of the international application has duly taken place on the date of mailing indicated above and no copy of the international application is required to be furnished by the applicant to the designated Office(s).

2. The following designated Offices have waived the requirement for such a communication at this time:
   AE,AL,AM,AP,AT,AZ,BA,BB,BG,BR,BY,CA,CH,CN,CR,CU,CZ,DE,DK,DM,EA,EE,EP,ES,FI,GB,GD,
   GE,GH,GM,HR,HU,ID,IL,IN,IS,JP,KE,KG,KZ,LC,LK,LR,LS,LT,LU,LV,MA,MD,MG,MK,MN,MW,MX,
   NO,NZ,OA,PL,PT,RO,RU,SD,SE,SG,SI,SK,SL,TJ,TM,TR,TT,TZ,UA,UG,UZ,VN,YU,ZA,ZW
   The communication will be made to those Offices only upon their request. Furthermore, those Offices do not require the applicant to furnish a copy of the international application (Rule 49.1(a-bis)).

3. Enclosed with this Notice is a copy of the international application as published by the International Bureau on
   21 September 2000 (21.09.00) under No. WO 00/54697

REMINDER REGARDING CHAPTER II (Article 31(2)(a) and Rule 54.2)

If the applicant wishes to postpone entry into the national phase until 30 months (or later in some Offices) from the priority date, **a demand for international preliminary examination** must be filed with the competent International Preliminary Examining Authority before the expiration of 19 months from the priority date.

It is the applicant's sole responsibility to monitor the 19-month time limit.

Note that only an applicant who is a national or resident of a PCT Contracting State which is bound by Chapter II has the right to file a demand for international preliminary examination.

REMINDER REGARDING ENTRY INTO THE NATIONAL PHASE (Article 22 or 39(1))

If the applicant wishes to proceed with the international application in the **national phase**, he must, within 20 months or 30 months, or later in some Offices, perform the acts referred to therein before each designated or elected Office.

For further important information on the time limits and acts to be performed for entering the national phase, see the Annex to Form PCT/IB/301 (Notification of Receipt of Record Copy) and Volume II of the PCT Applicant's Guide.

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No. (41-22) 740.14.35

Authorized officer
J. Zahra

Telephone No. (41-22) 338.83.38

Continuation of Form PCT/IB/308

NOTICE INFORMING THE APPLICANT OF THE COMMUNICATION OF THE INTERNATIONAL APPLICATION TO THE DESIGNATED OFFICES

Date of mailing (day/month/year)	IMPORTANT NOTICE
21 September 2000 (21.09.00)	
Applicant's or agent's file reference	**International application No.**
4109 PCT	PCT/SE00/00359

The applicant is hereby notified that, at the time of establishment of this Notice, the time limit under Rule 46.1 for making amendments under Article 19 has not yet expired and the International Bureau had received neither such amendments nor a declaration that the applicant does not wish to make amendments.

PTO/PCT Rec'd SEP 2001

PCT

For receiving Office use only

International Application No.

International Filing Date

Name of receiving Office and "PCT International Application"

REQUEST

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty.

Applicant's or agent's file reference *(if desired) (12 characters maximum)* Case: 4109 PCT

Box No. I TITLE OF INVENTION Method, arrangement and use for applying a a spacer to an implant by means of a screw

Box No. II APPLICANT

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)*

Nobel Biocare AB (publ)
Box 5190
S-402 26 GÖTEBORG
SWEDEN

☐ This person is also inventor.

Telephone No. +46 (0)31 81 88 00

Facsimile No. +46 (0)31 16 31 52

Teleprinter No.

State *(that is, country)* of nationality: SE

State *(that is, country)* of residence: SE

This person is applicant for the purposes of: ☐ all designated States ☒ all designated States except the United States of America ☐ the United States of America only ☐ the States indicated in the Supplemental Box

Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)*

JÖRNÉUS, Lars
Riabergsvägen 7B
S-430 30 FRILLESÅS
SWEDEN

This person is:

☐ applicant only

☒ applicant and inventor

☐ inventor only *(If this check-box is marked, do not fill in below.)*

State *(that is, country)* of nationality: SE

State *(that is, country)* of residence: SE

This person is applicant for the purposes of: ☐ all designated States ☐ all designated States except the United States of America ☒ the United States of America only ☐ the States indicated in the Supplemental Box

☐ Further applicants and/or (further) inventors are indicated on a continuation sheet.

Box No. IV AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE

The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as: ☒ agent ☐ common representative

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)*

OLSSON, Gunnar

Nobel Biocare AB (publ)
Box 5190
S-402 26 GÖTEBORG
SWEDEN

Telephone No. +46 (0)31 81 89 29

Facsimile No. +46 (0)31 16 31 52

Teleprinter No.

☐ **Address for correspondence:** Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.

Box No.V DESIGNATION OF STATES

The following designations are hereby made under Rule 4.9(a) *(mark the applicable check-boxes; at least one must be marked)*:

Regional Patent

- [x] **AP** **ARIPO Patent:** GH Ghana, GM Gambia, KE Kenya, LS Lesotho, MW Malawi, SD Sudan, SL Sierra Leone, SZ Swaziland, TZ United Republic of Tanzania, UG Uganda, ZW Zimbabwe, and any other State which is a Contracting State of the Harare Protocol and of the PCT
- [x] **EA** **Eurasian Patent:** AM Armenia, AZ Azerbaijan, BY Belarus, KG Kyrgyzstan, KZ Kazakhstan, MD Republic of Moldova, RU Russian Federation, TJ Tajikistan, TM Turkmenistan, and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT
- [x] **EP** **European Patent:** AT Austria, BE Belgium, CH and LI Switzerland and Liechtenstein, CY Cyprus, DE Germany, DK Denmark, ES Spain, FI Finland, FR France, GB United Kingdom, GR Greece, IE Ireland, IT Italy, LU Luxembourg, MC Monaco, NL Netherlands, PT Portugal, SE Sweden, and any other State which is a Contracting State of the European Patent Convention and of the PCT
- [x] **OA** **OAPI Patent:** BF Burkina Faso, BJ Benin, CF Central African Republic, CG Congo, CI Côte d'Ivoire, CM Cameroon, GA Gabon, GN Guinea, GW Guinea-Bissau, ML Mali, MR Mauritania, NE Niger, SN Senegal, TD Chad, TG Togo, and any other State which is a member State of OAPI and a Contracting State of the PCT *(if other kind of protection or treatment desired, specify on dotted line)* .....

National Patent *(if other kind of protection or treatment desired, specify on dotted line)*:

- [x] **AE** United Arab Emirates
- [x] **AL** Albania .....
- [x] **AM** Armenia .....
- [x] **AT** Austria .....
- [x] **AU** Australia .....
- [x] **AZ** Azerbaijan
- [x] **BA** Bosnia and Herzegovina .....
- [x] **BB** Barbados
- [x] **BG** Bulgaria .....
- [x] **BR** Brazil .....
- [x] **BY** Belarus .....
- [x] **CA** Canada
- [x] **CH** and **LI** Switzerland and Liechtenstein
- [x] **CN** China .....
- [x] **CR** Costa Rica .....
- [x] **CU** Cuba .....
- [x] **CZ** Czech Republic .....
- [x] **DE** Germany .....
- [x] **DK** Denmark .....
- [x] **DM** Dominica
- [x] **EE** Estonia .....
- [x] **ES** Spain .....
- [x] **FI** Finland .....
- [x] **GB** United Kingdom
- [x] **GD** Grenada
- [x] **GE** Georgia .....
- [x] **GH** Ghana .....
- [x] **GM** Gambia
- [x] **HR** Croatia .....
- [x] **HU** Hungary .....
- [x] **ID** Indonesia
- [x] **IL** Israel .....
- [x] **IN** India .....
- [x] **IS** Iceland
- [x] **JP** Japan .....
- [x] **KE** Kenya .....
- [x] **KG** Kyrgyzstan .....
- [x] **KP** Democratic People's Republic of Korea .....
- [x] **KR** Republic of Korea .....
- [x] **KZ** Kazakhstan .....
- [x] **LC** Saint Lucia
- [x] **LK** Sri Lanka
- [x] **LR** Liberia
- [x] **LS** Lesotho .....
- [x] **LT** Lithuania
- [x] **LU** Luxembourg
- [x] **LV** Latvia
- [x] **MA** Morocco .....
- [x] **MD** Republic of Moldova .....
- [x] **MG** Madagascar .....
- [x] **MK** The former Yugoslav Republic of Macedonia .....
- [x] **MN** Mongolia
- [x] **MW** Malawi .....
- [x] **MX** Mexico .....
- [x] **NO** Norway
- [x] **NZ** New Zealand .....
- [x] **PL** Poland .....
- [x] **PT** Portugal .....
- [x] **RO** Romania
- [x] **RU** Russian Federation .....
- [x] **SD** Sudan
- [x] **SE** Sweden
- [x] **SG** Singapore
- [x] **SI** Slovenia .....
- [x] **SK** Slovakia .....
- [x] **SL** Sierra Leone .....
- [x] **TJ** Tajikistan .....
- [x] **TM** Turkmenistan .....
- [x] **TR** Turkey .....
- [x] **TT** Trinidad and Tobago .....
- [x] **TZ** United Republic of Tanzania
- [x] **UA** Ukraine .....
- [x] **UG** Uganda .....
- [x] **US** United States of America .....
- [x] **UZ** Uzbekistan .....
- [x] **VN** Viet Nam .....
- [x] **YU** Yugoslavia .....
- [x] **ZA** South Africa .....
- [x] **ZW** Zimbabwe .....

Check-boxes reserved for designating States which have become party to the PCT after issuance of this sheet:

- [ ] .....
- [ ] .....

Precautionary Designation Statement: In addition to the designations made above, the applicant also makes under Rule 4.9(b) all other designations which would be permitted under the PCT except any designation(s) indicated in the Supplemental Box as being excluded from the scope of this statement. The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit. *(Confirmation (including fees) must reach the receiving Office within the 15-month time limit.)*

Box No. VI PRIORITY CLAIM ☐ Further priority claims are indicated in the Supplemental Box.

Filing date of earlier application (day/month/year)	Number of earlier application	Where earlier application is: national application: country	regional application:* regional Office	international application: receiving Office
item (1) 18/03/99 18 March, 1999	99 00967-2	SE		
item (2)				
item (3)				

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* *Where the earlier application is an ARIPO application, it is mandatory to indicate in the Supplemental Box at least one country party to the Paris Convention for the Protection of Industrial Property for which that earlier application was filed (Rule 4.10(b)(ii)). See Supplemental Box.*

Box No. VII INTERNATIONAL SEARCHING AUTHORITY

Choice of International Searching Authority (ISA) *(if two or more International Searching Authorities are competent to carry out the international search, indicate the Authority chosen; the two-letter code may be used):*
ISA/ SE

Request to use results of earlier search; reference to that search *(if an earlier search has been carried out by or requested from the International Searching Authority):*
Date *(day/month/year)* 18 March, 1999 Number SE99/00356 Country *(or regional Office)* SE

Box No. VIII CHECK LIST; LANGUAGE OF FILING

This international application contains the following **number of sheets**:

request	:	3
description (excluding sequence listing part)	:	13
claims	:	7
abstract	:	1
drawings	:	2
sequence listing part of description	:	
Total number of sheets	:	26

This international application is **accompanied** by the item(s) marked below:

1. ☐ fee calculation sheet
2. ☒ separate signed power of attorney
3. ☒ copy of general power of attorney; reference number, if any: 332
4. ☐ statement explaining lack of signature
5. ☐ priority document(s) identified in Box No. VI as item(s):
6. ☐ translation of international application into (language):
7. ☐ separate indications concerning deposited microorganism or other biological material
8. ☐ nucleotide and/or amino acid sequence listing in computer readable form
9. ☒ other *(specify)*: ITS-report

Figure of the drawings which should accompany the abstract: 1

Language of filing of the international application: Swedish

Box No. IX SIGNATURE OF APPLICANT OR AGENT

Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request).

Nobel Biocare AB (publ)

/ Gunnar Olsson / AGENT

For receiving Office use only

1. Date of actual receipt of the purported international application:	2. Drawings: ☐ received: ☐ not received:
3. Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application:	
4. Date of timely receipt of the required corrections under PCT Article 11(2):	
5. International Searching Authority (if two or more are competent): ISA/	6. ☐ Transmittal of search copy delayed until search fee is paid.

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Date of receipt of the record copy by the International Bureau:

NE

28-04-2000

PCT

REQUEST

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty.

For receiving Office use only PCT

International Application No. PCT/SE 00/00359

International Filing Date 24-02-2000

The Swedish Patent Office PCT International Application

Name of receiving Office and "PCT International Application"

Applicant's or agent's file reference *(if desired) (12 characters maximum)* 4109 PCT

Box No. I TITLE OF INVENTION Method, arrangement and use for applying a a spacer to an implant by means of a screw

Box No. II APPLICANT

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)*

Nobel Biocare AB (publ)
Box 5190
S-402 26 GÖTEBORG
SWEDEN

☐ This person is also inventor.

Telephone No. +46 (0)31 81 88 00

Facsimile No. +46 (0)31 16 31 52

Teleprinter No.

State *(that is, country)* of nationality: SE

State *(that is, country)* of residence: SE

This person is applicant for the purposes of: ☐ all designated States ☒ all designated States except the United States of America ☐ the United States of America only ☐ the States indicated in the Supplemental Box

Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)*

JÖRNÉUS, Lars
Riabergsvägen 7B
S-430 30 FRILLESÅS
SWEDEN

This person is:

☐ applicant only

☒ applicant and inventor

☐ inventor only *(If this check-box is marked, do not fill in below.)*

State *(that is, country)* of nationality: SE

State *(that is, country)* of residence: SE

This person is applicant for the purposes of: ☐ all designated States ☐ all designated States except the United States of America ☒ the United States of America only ☐ the States indicated in the Supplemental Box

☐ Further applicants and/or (further) inventors are indicated on a continuation sheet.

Box No. IV AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE

The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as: ☒ agent ☐ common representative

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)*

OLSSON, Gunnar

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Telephone No. +46 (0)31 81 89 29

Facsimile No. +46 (0)31 16 31 52

Teleprinter No.

☐ **Address for correspondence:** Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.

Box No.V DESIGNATION OF STATES

The following designations are hereby made under Rule 4.9(a) *(mark the applicable check-boxes; at least one must be marked)*:

Regional Patent

☒ **AP** **ARIPO Patent:** **GH** Ghana, **GM** Gambia, **KE** Kenya, **LS** Lesotho, **MW** Malawi, **SD** Sudan, **SL** Sierra Leone, **SZ** Swaziland, **TZ** United Republic of Tanzania, **UG** Uganda, **ZW** Zimbabwe, and any other State which is a Contracting State of the Harare Protocol and of the PCT

☒ **EA** **Eurasian Patent:** **AM** Armenia, **AZ** Azerbaijan, **BY** Belarus, **KG** Kyrgyzstan, **KZ** Kazakhstan, **MD** Republic of Moldova, **RU** Russian Federation, **TJ** Tajikistan, **TM** Turkmenistan, and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT

☒ **EP** **European Patent:** **AT** Austria, **BE** Belgium, **CH and LI** Switzerland and Liechtenstein, **CY** Cyprus, **DE** Germany, **DK** Denmark, **ES** Spain, **FI** Finland, **FR** France, **GB** United Kingdom, **GR** Greece, **IE** Ireland, **IT** Italy, **LU** Luxembourg, **MC** Monaco, **NL** Netherlands, **PT** Portugal, **SE** Sweden, and any other State which is a Contracting State of the European Patent Convention and of the PCT

☒ **OA** **OAPI Patent:** **BF** Burkina Faso, **BJ** Benin, **CF** Central African Republic, **CG** Congo, **CI** Côte d'Ivoire, **CM** Cameroon, **GA** Gabon, **GN** Guinea, **GW** Guinea-Bissau, **ML** Mali, **MR** Mauritania, **NE** Niger, **SN** Senegal, **TD** Chad, **TG** Togo, and any other State which is a member State of OAPI and a Contracting State of the PCT *(if other kind of protection or treatment desired, specify on dotted line)* .....

National Patent *(if other kind of protection or treatment desired, specify on dotted line)*:

☒ **AE** United Arab Emirates
☒ **AL** Albania
☒ **AM** Armenia
☒ **AT** Austria
☒ **AU** Australia
☒ **AZ** Azerbaijan
☒ **BA** Bosnia and Herzegovina
☒ **BB** Barbados
☒ **BG** Bulgaria
☒ **BR** Brazil
☒ **BY** Belarus
☒ **CA** Canada
☒ **CH and LI** Switzerland and Liechtenstein
☒ **CN** China
☒ **CR** Costa Rica
☒ **CU** Cuba
☒ **CZ** Czech Republic
☒ **DE** Germany
☒ **DK** Denmark
☒ **DM** Dominica
☒ **EE** Estonia
☒ **ES** Spain
☒ **FI** Finland
☒ **GB** United Kingdom
☒ **GD** Grenada
☒ **GE** Georgia
☒ **GH** Ghana
☒ **GM** Gambia
☒ **HR** Croatia
☒ **HU** Hungary
☒ **ID** Indonesia
☒ **IL** Israel
☒ **IN** India
☒ **IS** Iceland
☒ **JP** Japan
☒ **KE** Kenya
☒ **KG** Kyrgyzstan
☒ **KP** Democratic People's Republic of Korea
☒ **KR** Republic of Korea
☒ **KZ** Kazakhstan
☒ **LC** Saint Lucia
☒ **LK** Sri Lanka
☒ **LR** Liberia
☒ **LS** Lesotho
☒ **LT** Lithuania
☒ **LU** Luxembourg
☒ **LV** Latvia
☒ **MA** Morocco
☒ **MD** Republic of Moldova
☒ **MG** Madagascar
☒ **MK** The former Yugoslav Republic of Macedonia
☒ **MN** Mongolia
☒ **MW** Malawi
☒ **MX** Mexico
☒ **NO** Norway
☒ **NZ** New Zealand
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☒ **SD** Sudan
☒ **SE** Sweden
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☒ **US** United States of America
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☒ **YU** Yugoslavia
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☒ **ZW** Zimbabwe

Check-boxes reserved for designating States which have become party to the PCT after issuance of this sheet:

☐ .....
☐ .....

Precautionary Designation Statement: In addition to the designations made above, the applicant also makes under Rule 4.9(b) all other designations which would be permitted under the PCT except any designation(s) indicated in the Supplemental Box as being excluded from the scope of this statement. The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit. *(Confirmation (including fees) must reach the receiving Office within the 15-month time limit.)*

Box No. VI PRIORITY CLAIM ☐ Further priority claims are indicated in the Supplemental Box.

Filing date of earlier application (day/month/year)	Number of earlier application	Where earlier application is: national application: country	regional application:* regional Office	international application: receiving Office
item (1) 18/03/99 18 March, 1999	99 00967-2	SE		
item (2)				
item (3)				

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* *Where the earlier application is an ARIPO application, it is mandatory to indicate in the Supplemental Box at least one country party to the Paris Convention for the Protection of Industrial Property for which that earlier application was filed (Rule 4.10(b)(ii)). See Supplemental Box.*

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Request to use results of earlier search; reference to that search *(if an earlier search has been carried out by or requested from the International Searching Authority)*:

Date *(day/month/year)*	Number	Country *(or regional Office)*
18 March, 1999	SE99/00356	SE

Box No. VIII CHECK LIST; LANGUAGE OF FILING

This international application contains the following **number of sheets**:

request	:	3 √
description (excluding sequence listing part)	:	13 √
claims	:	7 √
abstract	:	1 √
drawings	:	2 √
sequence listing part of description	:	
Total number of sheets	:	26 √

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1. ☐ fee calculation sheet
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4. ☐ statement explaining lack of signature
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7. ☐ separate indications concerning deposited microorganism or other biological material
8. ☐ nucleotide and/or amino acid sequence listing in computer readable form
9. ☒ other *(specify)*: ITS-report

Figure of the drawings which should accompany the abstract: 1

Language of filing of the international application: Swedish

Box No. IX SIGNATURE OF APPLICANT OR AGENT

Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request).

Nobel Biocare AB (publ)

/ Gunnar Olsson / AGENT

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1. Date of actual receipt of the purported international application: 24-02-2000
2. Drawings: ☒ received: ☐ not received:
3. Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application:
4. Date of timely receipt of the required corrections under PCT Article 11(2):
5. International Searching Authority (if two or more are competent): ISA/ SE
6. ☐ Transmittal of search copy delayed until search fee is paid.

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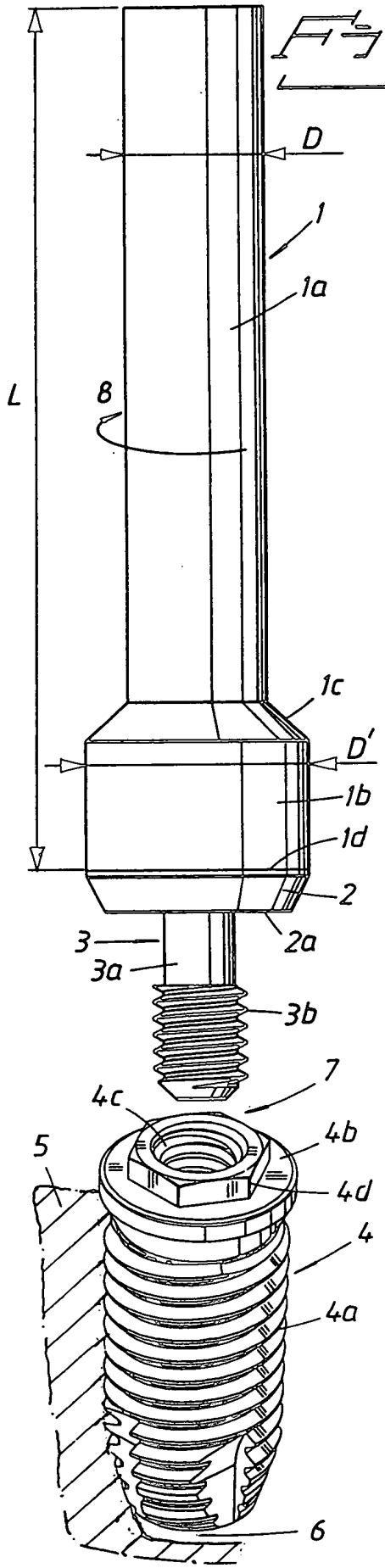
Fig. 1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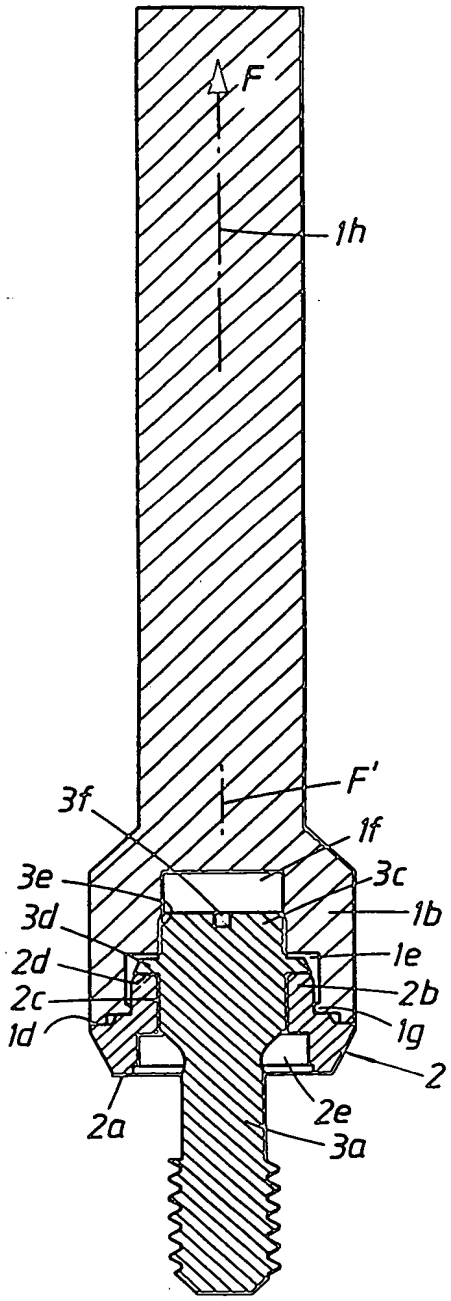
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Fig. 2

Fig. 3

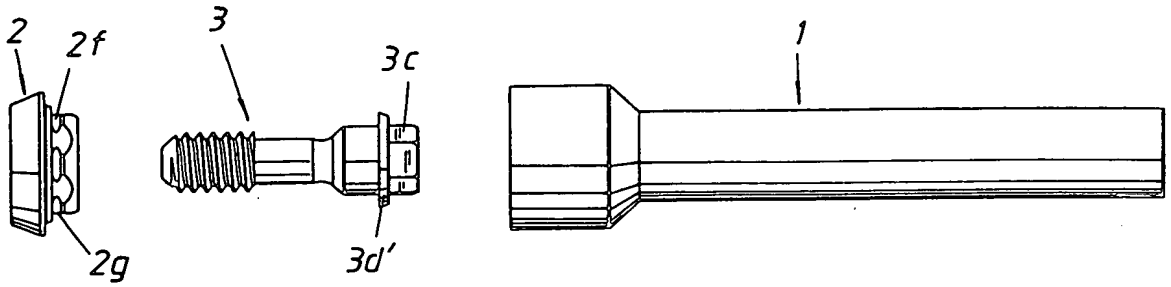


Fig. 4

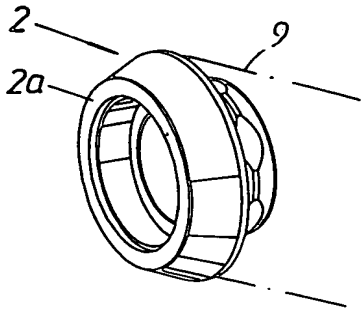


Fig. 4a

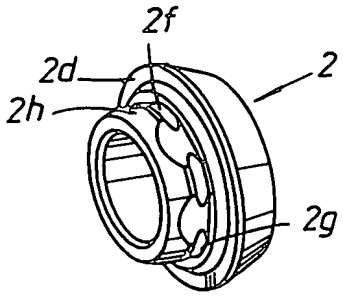


Fig. 5

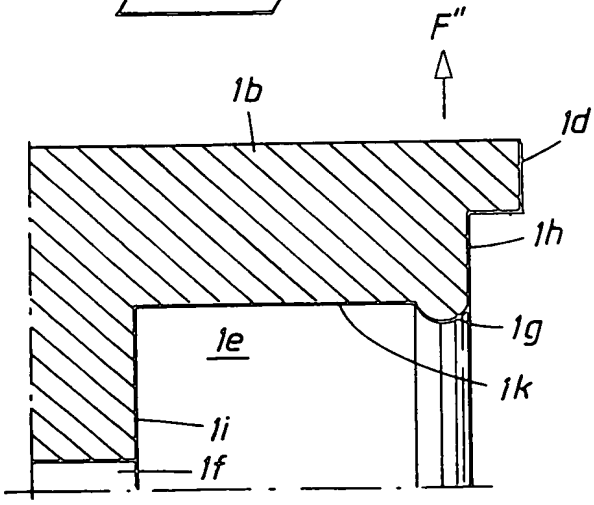
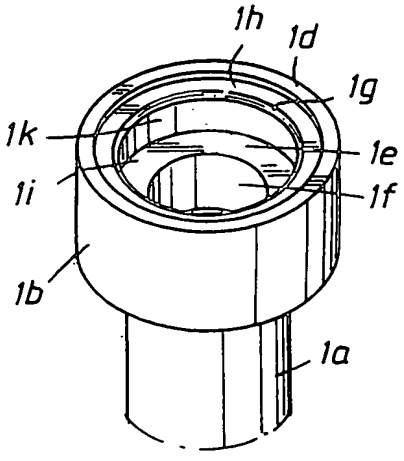


Fig. 6



PCT/SE00/00359
24.02.2000

(Hållare)

BENÄMNING

Förfarande, arrangemang och användning för applicering av distans till implantat medelst skruv.

Föreliggande uppfinning avser bl.a. ett förfarande att till fastväxt implantat, företrädesvis i käkben, medelst hållare fastgöra en distans med hjälp av skruv. Skruvens gänguppbärande del skall därvid sträcka sig genom en urtagning i distansen för att med sin gänga samverka med implantatets gänga. Skruvens skalle skall vidare vara samverkbar med en fastdragnings- och låsyta i distansen som därvid även uppvisar en med en ovanyta på implantatet samverkbar anliggningsyta. Uppfinningen avser även arrangemang i anslutning till nämnda faktaförhållanden. Dessutom avser uppfinningen en användning av hållare för fastsättning i implantat av distans med hjälp av skruv.

Efter det att implantatet har läkt fast, vilket normalt tar 3-6 månader efter fixtur- eller implantatinstallation, skall distansanslutningen utföras. I anslutning härtill upptages ett snitt genom tandköttet så att implantatets övre yta exponeras. Vid anslutningen av distansen, som även kallas distanselement, fastskruvas detta vid implantatet eller fixturen. De distanser som därvid normalt användes består av en huvudsakligen cylindrisk komponent som skall skruvas fast med en lös separat skruv. I flertalet fall uppvisar distansen en invändig sexkant som skall passa på en motsvarande yttre sexkant på implantatets övre del. Det förekommer även distansutformningar där själva distanskroppen och skruven har integrerats i en enhet. Det är dock fördel med att kunna använda skruv och distans såsom två separata enheter. Skruvens åtdrag-

ning kan nämligen därvid förbättras genom att vare att de på skruvskallen verkande friktionsmomentet minskas genom att skruvskallens anliggningsradie blir mindre jämfört med fallet då separat integrerad distans och skruv användes. Dessutom kan skruv och distans då de bildar olika enheter tillverkas i olika material. Distansen tillverkas därvid lämpligen i ett vävnadsvänligt material, t.ex. titan eller något keramiskt material. Skruven kan å andra sidan tillverkas i starkare material och beläggas med friktionsreducerande beläggning så att en bättre förspänning i skruvförbandet erhålles. Det är härvid ett alternativ eller komplement att välja ett skruvmaterial som i sig ger låg friktion mellan skruvens gänga och implantatets motsvarande inre gängning. Ett sådant materialval kan t.ex. vara vissa guldlegeringar.

Rent allmänt är det relativt svårt att hantera små distans- och skruvkomponenter i eller vid munhålan bland annat på grund av att det är ont om plats. Man har försökt att underlätta hanteringen och fasthållningen av distans och skruv på olika sätt. Så t.ex. har man utnyttjat sig av ett speciellt mothåll som anbringas på distansen samtidigt som en skruvmejsel engageras i skruvskallens spår. Det finns även exempel på s.k. förmonterade engångs-distanshållare som består av två sinsemellan rörliga delar, varav den ena greppar om skruven och den andra om distansen.

I anslutning till nämnda kända teknik hänvisas till de amerikanska patentskrifterna 5 145 371, 5 322 443, 5 462 436, 5 437 550 och 5 692 904.

Det föreligger rent allmänt ett stort behov av att kunna hantera små distans- och skruvkomponenter i enlighet med ovan. Det är härvid angeläget att kunna tillhandahålla förfaranden, arrangemang och använd-

ningar som är tekniskt enkla att genomföra och använda. Så t.ex. uppkommer problem med att använda speciella mothåll som anbringas på distansen eftersom det föreligger relativt dålig bärförmåga och komponenterna inte är förmonterade utan appliceras av operatören eller dennas assistent under operationstillfället. Att utnyttja hållare med inbördes rörliga delar representerar en tekniskt komplicerad och otymplig lösning som inte är förenligt med en ändamålsenlig hantering och användning.

Uppfinningen har till ändamål att lösa bl.a. denna problematik och det som huvudsakligen kan anses vara kännetecknande för ett förfarande enligt uppfinningen är att först skruven i sitt genomförda läge i distansen och distansen sammanhålles inbördes vridfast i hållaren så att distansens anliggningsyta skjuter utanför hållaren och den gänguppbärande delen på skruven i sin tur skjuter utanför anliggningsyta. Ytterligare särdrag är att den av hållaren, distansen och skruven på så sätt etablerade vridfasta enheten därefter anbringas mot implantatet till en samverkningspositionen för implantatets och skruvens gängor. Enheten tilldelas därefter vridrörelser under vilka skruvens gänga nedskruvas i implantatets gänga. Vid ett förutbestämt nedskruvnings- eller iskruvningsläge, företrädesvis där samverkan mellan distansens anliggningsyta och implantatets ovanyta blivit etablerad, avskiljes eller såras hållaren från distansen och skruven medelst en särskiljningsrörelse, t.ex. undanfjädringsrörelse, som företrädesvis skiljer sig från vridrörelsen. Därvid frilägges skruvens skalle för eventuell efterdragning.

I en utföringsform karakteriseras det nya förfarandet av att för ernående av sammanhållningsfunktionen för hållaren, distans och skruv till en enda gemensam

vridfast en skruven appliceras i distansen till ett läge där dess skalle anligger mot den inledningsvis omnämnda fastdragnings- och låsytan på distansen och att sålunda sammanförda distans och skruv därefter appliceras genom inpressning i en ändurtagning i hållaren, eller hållaren pressas över distansen och skruven via nämnda urtagning. I en utföringsform arbetar hållaren med återfjädrande och/eller elastisk funktion och/eller snäppfunktion, medelst vilken eller vilka distansen och skruven i sina hopförda lägen låses till hållaren i vridningsriktningen. I fastskruvningsförloppet bringas distansen företrädesvis i samverkan med implantatets ovanyta enbart via en ringformad ändyta, dvs. 6-kantformade eller andra typer av verksamma vridningsfixerande ytor föreligger inte i detta utföringsexempel.

Det som huvudsakligen kan anses vara kännetecknande för ett arrangemang enligt uppfinningen är att hållaren före idragningen av skruven i implantatets gänga uppbär skruven i dess i distansen applicerade och genomförda läge och distansen vridfast med distansens anliggningsyta skjutande utanför hållaren och skruvens gänguppbärande del skjutande utanför anliggningsytan. Ytterligare kännetecken är därvid att en på så sätt av hållaren, distansen och skruven bildad vridfast enhet är tillförbar implantatet en samverkningsposition mellan implantatets och skruvens gängor där iskruvning av skruvens gänga i implantatets gänga är effektuerbar medelst vrid- eller skruvrörelser på enheten. Ett ytterligare kännetecken är att hållaren i ett uppkommande iskruvningsläge, företrädesvis där distansens anliggningsyta samverkar med implantatets ovanyta, är anordnad åtskiljbart från distansen och skruven med isärskiljningsrörelser som företrädesvis skiljer sig från vridrörelsen, varvid skruvens skalle blir frilagd för eventuell vidare- eller efterdragning. Nämnda sär-

skiljning [redacted] effektueras medelst un[redacted]fjädringsfunktionen i hållaren (aktuell hållardel).

I en utföringsform för det nya arrangemanget är hållaren åtminstone i sin med distansen och skruven samverkbara del utförd i plast eller annat elastiskt material. Distansen och skruven kan i nämnda hopförda läge vara applicerbara i en ändurtagning i nämnda hållardel som mottar skruven och distansen via inbördes vridrörelser mellan hållare, distans, skruv hindrande funktion, vilken kan erhållas från styrytor, fjädringsfunktion, snäppfunktion, etc. I en ytterligare utföringsform är hållaren respektive hållardelen försedd med en första urtagning för skruvens skalle och en andra urtagning för fasthållningsdel på distansen. Hållaren är därvid påträdbar på fasthållningsdelen och skruvskallen och fasthåller distansen och skruven medelst inbyggd fjädringsfunktion och/eller elasticitet i de första och andra urtagningarnas väggformade material, eventuellt i kombination med snäppfunktion. Hållaren kan därvid bestå av eller innefatta ett långsträckt element i plast eller motsvarande material. Hållaren kan anordnas förhållandevis lätt åtskiljbart från distansen och skruven i dessas i implantatet applicerade eller fastskruvade läge, med hjälp av avdragningsrörelse(-r) som väsentligen sammanfaller med implantatets längdriktning eller med en tippningsrörelse, vid vilken hållaren går ur grepp (t.ex. fjädrar undan) med nämnda fasthållningsdel och skalle på distansen respektive skruven. I en ytterligare utföringsform kan distansen vara försedd med en ringformad anliggningsyta som saknar invändiga styrytor, t.ex. invändiga styrytor i form av 4-, 6-, eller flerkantsytor. Hållaren och dess infästning till distansen och skruven kan vidare vara anordnade att medge en första förankringsanliggning mellan implantatets ovanyta och distansens anliggningsyta som

eliminerar risk för lossdragning av implantatet i benet (tandbenet). Efter hållarens friläggning från distansen och skruven är den senare idragbar för åstadkommande av en andra förankringsfunktion som är effektuerad med en kraft som väl överstiger kraften för den första förankringsfunktionen. Efterdragnings-funktionen effektueras på i och för sig känt sätt med en skruvmejsel av konventionellt slag i sammanhanget. I anslutning till den andra förankringsanliggningen kan utnyttjas mothållsfunktion i distansen. Därvid utnyttjas ett verktyg som kvarhåller distansen i ett bestämt vridvinkelsläge medan skruven påverkas av skruvmejseln eller motsvarande. I anslutning härtill kan skruvens gänga vara tillverkad i förhållandevis starkt material och/eller belagd med friktionsreduce-rande beläggning i syfte att förbättra förankringen mellan distans, skruv och implantat.

Skruvens gängdiameter kan väljas så att den väsentligt understiger anliggningsytans diameter. Så t.ex. kan skruvens gängdiameter vara hälften av anliggningsytans diameter (genomsnittsdiameter). Genom val av diametern på skruvgängan och anliggningsytan och val av lågfrik-tionsmaterial och/eller lågfriktionsbeläggning kan friktionskoefficienten bli väsentligen lägre, t.ex. hälften så stor, vid gängan som vid anliggningsytan. Detta medför att säkert mothåll (dvs. ingen risk för lossdragning av implantatet relativt tandbenet) kan appliceras till distansens utsida i samband med efter-dragningen trots att frånvaron av mekanisk låsning via verksamma låsytor saknas mellan distanser och implan-tat.

Ett arrangemang kan huvudsakligen kännetecknas av att hållaren uppbär distansen och skruven vridfast med anliggningsytan skjutande utanför hållaren och med

skruven sig genomsträckande distans och skjutande utanför anliggningsytan med sin gänguppbärande el.

Hållaren är företrädesvis utförd med ändurtagning(-ar) i vilken/vilka distansen och skruvskallen är inpressade och kvarhållna med fjädringsfunktion och/eller elasticitet i hållaren och eventuell snäppfunktion. Hållaren bildar tillsammans med distansen och skruven en vridfast enhet som underlättar appliceringen till implantatet och handhavande och frakt av distansen och skruven.

En användning enligt uppfinningen kan huvudsakligen kännetecknas av att som hållare användes ett långsträckt element som vridfast uppbär distansen och skruven i sammanfört skick och med distansens anliggningsyta mot implantatet skjutande utanför hållaren och skruvens gängförsedda del i sin tur skjutande utanför anliggningsytan.

Vidareutvecklingar av användningen kännetecknas av att en fjädrande och/eller elastisk del på hållaren användes för att gripa om och fasthålla distansen och skruven i vridfasta lägen i förhållande till hållaren och varandra. Hållaren kan även användas för att överföra manuella vridrörelser till skruven vid denna iskruvning i implantatet, dvs. tjäna som skaft.

Genom det i ovan föreslagna erhålles en rad fördelar som bl.a. löser den inledningsvis omnämnda problematiken. Distansen och distansskruven kan monteras ihop med en hållare utförd t.ex. i plast som kläms medelst fjädringsfunktionen i hållardelen eller snäpps fast på distansen och skruven så att dessa tre komponenter på ett enkelt sätt hålles samman. Distansen undersida kan utföras utan sexkantfattning som är allmänt använd i

dessa samm[illegible]ang. Distansens unders[illegible] kan således utföras som ett urtag med cirkulärt tvärsnitt, vilket väsentligt förbilligar tillverkningen. Detta medför att distanselementet kan roteras ned till korrekt position på fixturen på ett mycket enklare sätt jämfört med vad som varit möjligt tidigare. Fördelarna med föreliggande uppfinning består främst i att man nu endast behöver hantera en enhet, som i sig lätt kan utformas för att underlätta hanteringen av distans och skruv som sådan. Dessutom behöver man inte längre var beroende av att distansen skall inta ett rotationsmässigt rätt läge mot implantatet. Väl på plats kan hållaren lätt avlägsnas och den slutliga åtdragningen sker. Vid åtdragningen kan om så önskas mothåll anbringas. Detta blir ofta aktuellt då man inte i onödan vill belasta gränsytan mellan ben och fixtur så att fixturen riskerar rubbas ur sitt läge. Vid en första analys kan man ledas att tro att åtdragning med mothåll ej är möjlig på grund av avsaknad av rotationslåsning med hjälp av sexkanter eller kanter med annat antal. En mer noggrann analys säger att så länge tillgängligt friktionsmoment mellan fixtur och distans är större än det friktionsmoment som verkar på implantatet via skruven, dvs. det s.k. gängmomentet, kan mothåll anbringas till distansen. Friktionsmomentet som överförs till fixturen på distansskruven beror på den dragkraft som finns i skruven, skruvens diameter och friktionskoefficienten mellan skruvgängan och fixturens inre gänga. Det mothållsmoment som kan anbringas beror på klämkraften mellan distan och fixtur som är lika stor som skruvens kragkraft, anliggningsytans diameter och friktionskoefficienten mellan distansen och fixturens övre yta.

För närvarande föreslagna utföringsformer av förfarandet, arrangemanget och användning som uppvisar de för uppfinningen signifikativa kännetecknen skall beskri-

vas i nedanstående under samtidig hänvisning till bifogade ritningar där

figur 1 i sidovy och delvis perspektiv visar hållare, distans och skruv förda i anslutning till ett implantat,

figur 2 i längdsnitt visar hållare, distans och skruv i hopsatt läge,

figur 3 från sidan visar hållare, skruv och distans i isärkopplade lägen,

figur 4-4a i perspektiv snett underifrån respektive ovanifrån visar distansen, och

figurer 5-6 i längdsnitt och förstöringar visar del av hållaren.

DETALJERAD UTFÖRINGSFORM

I figuren 1 är en hållare angiven med 1. Hållaren innefattar en långsträckt del 1a och en vid den långsträckta delen anordnad utvidgad del 1b. Hållaren kan bestå av plastmaterial, varvid delen 1a kan utgöra en väsentligen solid del och delen 1b i enlighet med nedanstående uppvisar en ändurtagning. Hållaren har en längd L av ca 20 mm och en diameter D på delen 1a av ca 3 mm. Delen 1b har en diameter D' på ca 5 mm. Delarna övergår i varandra via en fas 1c. Till hållaren är vridfast applicerat en distans 2 som skjuter utanför hållarens ändyta 1d med en del som uppbär en anliggningsyta 2a. I enlighet med nedanstående är en skruv applicerad till hållaren och sträcker sig genom en urtagning i distansen så att dess gänguppbärande del skjuter utanför anliggningsytan 2a. Skruven är visad med 3 och skruvens gänguppbärande del med 3a

samt självgängan med 3b. Figuren visar även ett implantat eller fixtur 4 som är fastläkt i ett ben, företrädesvis i ett symboliskt angivet tandben 5. Implantatet eller fixturen kan vara av i och för sig känt slag som uppvisar en eller flera utvändiga gängor 4a. Implantatet är iskruvat i en hålupptagning 6 i benet. Implantatet är även försedd med en ovanyta 4b, mot vilken anliggningsytan 2a på distansen skall anligga då distansen är fastskruvad i implantatet medelst skruven 3. Implantatet uppvisar även en invändig gänga 4c, med vilken gängan 3b på skruven är iskruvningsbar. Implantatet är även försett med en sexkant, medelst vilken implantatet är nedskruvbar i hålupptagningen 6 i tandbenet 5. Figuren 1 visar en position 7 i vilken hållaren är förd mot implantatet för samverkan mellan gängorna 3b och 4c.

I enlighet med figuren 2 kan distansen vara utformad på i och för sig känt sätt. Således ingår en lagringsdel 2b för skruvens skalle 3c. Delens 2b lagringsurtagning för skruvskallen 3c är visad med 2c. Skruven är vid skruvskallen 3c även försedd med en utskjutande fläns eller flikar 3d som samverkar med en ovanyta 2d på distanselementet. Delen 1b på hållaren är försedd med en ändurtagning 1e. Distansen 2 är införd i denna urtagning 1e. Undertill uppvisar distansen en urtagning 2e. Änddelen 1b uppvisar även en andra urtagning 1f, i vilken övre delen på skruvskallen är införd. Delen 1b är även försedd med inåtriktad fläns 1g eller flänsdelar som är samverkbara med utsidan på distansdelen 2a. Distansdelen 2a och nämnda inskjutande fläns/flänsdelar är därvid valda så en vridfast förankring föreligger för distansen 2 i delen 1b. Urtagningen 1f är därvid vald med ett diametermått eller ett motsvarande mått i förhållande till en del 3e på skruven som skjuter in i urtagningen 1f så att vridfast funktion föreligger. Urtagningen 1f kan vara

cylindrisk eller uppvisar en flerkant form som motsvarar skruvens form vid nämnda inskjutande del 3e. Arrangemanget är således sådant att både distansen och skruven tilldelas en vridfast förankring i hållaren 1.

Av figurerna 1 och 2 framgår således att hållaren med distans och skruv kan föras i samverkningsläge 7 med implantatet så att gängan 3b erhåller grepp i den invändiga gängan 4c. Hållaren kan därefter tilldelas vridrörelser 8 som fungerar som nedskruvningsrörelser för skruven 3 i implantatet 4 via gängorna 3b och 4c. Genom att distansen 2 och skruven 3 är vridfast anordnade i hållaren 1 kan nedskruvning ske tills den undre anliggningsytan 2a på distansen går emot den övre anliggningsytan 4b på implantatet. Fasthållningsfunktionen kan därvid utföras så att kraften på vridrörelsen 8 maximeras och att skruven och distansen slirar i förhållande till hållaren då denna kraft når upp till ett visst värde. På så sätt undvikes risker för lossdragning av implantatet 4 i benet 5 med enheten. Förankringsarrangemanget för distansen 2 och skruven 3 i hållaren är även sådant att då skruven 3 är helt eller delvis nedgängad i implantatet hållaren kan frigöras från den helt eller delvis nedskruvade skruven och den till skruven löst eller fast i längdriktningen fixerade distansen med en lossdragningskraft F som väsentligen sammanfaller hållarens 1 längdaxel 1h och/eller med en vridvinkelskraft F' vid vars respektive applicering eller appliceringar hållaren medelst undanfjädring i hållarmaterialet går ur grepp med distansen och skruven. Skruvskallen 3c frilägges därvid så att skruvspåret 3f blir åtkomligt för annat verktyg, t.ex. en konventionell skruvmejsel.

Efter friläggningen av hållaren kan denna kasseras. Tillverkningen av hållaren blir förhållandevis billig tack vare plastmaterialvalet. Endast en del av hålla-

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ren behöver och för sig vara av plastmaterial, dvs. delen 1b som skall utöva elasticitetsrörelser i fasthållningsfunktionen för skruven och distansen. Resterande del av hållaren kan i och för sig bestå av återanvändningsbart material, varvid i och för sig kända hopsättningsorgan kan utnyttjas mellan delarna 1a och 1b.

Figuren 3 visar hållaren 1 och distansen 2 och skruven 3 i skilda lägen. Vid montering av distans och skruv i hållaren (eller vice versa) sammanföres skruven och distansen till det i figuren 2 motsvarande läget, varefter appliceringen till hållaren eller hållarens applicering till distans och skruv effektueras. Hållare, distans och skruv levereras företrädesvis i det enligt figuren 1 visade tillståndet. När iskruvning i implantatet åstadkommes med hjälp av hållaren avlägsnas denna och kasseras eller återanvändes delvis enligt ovanstående. I figuren 3 har det längdriktningsfixerande organet 3d' formen av en runt skruvskallen sig sträckande hel fläns. I figuren 3 visas även intagningar 2f och 2g på distanselementet, vilka intagningar är samverkbara med den inskjutande flänsen 1g (figur 2) för bildande av knaster eller snäpporgan som ingår i den vridvinkelfixerande funktionen. I figuren 4 framgår den ringformade anliggningsytan 2a i sin helhet på distansen 2. Av figuren 4 framgår även avsaknaden av invändig sexkant. En dylik invändig sexkant samverkar normalt med implantatets sexkant 4d (jfr figuren 1). En dylik sexkant eller motsvarande är inte aktuell i föreliggande fall av ovanstående skäl. I figuren 4 anges även symboliskt en mothållsfunktion med 9, vilken mothållsfunktion är aktiverbar då skruven 3 efterdrages.

I figurerna 4a och 5 är snäppfunktionen mellan distans och hållare visad mera i detalj. Intagningarna på

distansen 2 representerade med intagningarna 2f och 2g. I utföringsexemplet föreligger sex dylika urtagningar. Flänsen 1g som i figuren 5 är visad förstorat i förhållande till distansen 2 i figuren 4a kan således fås att snäppa ned i intagningarna efter det att en undanfjädringskraft F'' påförts en radiell undanfjädringsrörelse i samma riktning som påföringskraften. Då flänsen 1g snäppt ned i intagningarna anligger ytorna 1d och 2d på hållaren 1b respektive distansen 2 mot varandra. Partierna 2h ovanför intagningarna bildar knaster eller snäpporgan för nämnda fläns 1g.

Figurerna 5 och 6 visar hållardelarna 1a och 1b samt urtagningarna 1e och 1f. Dessutom anges en radiell ringformad yta med 1h, vilken är väsentligen parallell med den ringformade ändytan 1d. Ytan 1h övergår i flänsen 1g. Väggen i urtagningen 1f är indikerad med 1k. Urtagningarna 1e och 1f är i det visade fallet cylindriska.

Uppfinningen är inte begränsad till den i ovan såsom exempel visade utföringsformen utan kan underkastas modifikationer inom ramen för efterföljande patentkrav och uppfinningstanken.

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PATENTKRAV

1. Förfarande att till fastväxt implantat (4), företrädesvis i käkben (5), medelst hållare (1) fastgöra en distans (2) medelst skruv, vars gänguppbärande del skall sträcka sig genom en urtagning i distansen för att med sin gänga samverka med implantatets gänga (4c) och vars skalle därvid är samverkbar med en fastdragnings- och låsyta i distansen som därvid även uppvisar en med en ovanyta på implantatet samverkbart anliggningsyta, k ä n n e t e c k n a d därav, att först skruven (3) i sitt genomförda läge i distansen och distansen (2) sammanhålles inbördes vridfast i hållaren (1) med distansens anliggningsyta skjutande utanför hållaren och den gänguppbärande delen skjutande utanför anliggningsytan, att den av hållaren, distansen och skruven på så sätt etablerade vridfasta enheten anbringas mot implantatet till nämnda gängors samverkningsposition (7) samt enheten tilldelas vridrörelser (8) under vilka skruvens gänga nedskruvas i implantatets gänga, och att vid förutbestämt ned- eller iskruvningsläge, företrädesvis där samverkan mellan distansens anliggningsyta och implantatets ovanyta (4b) etableras, hållaren avskiljes från distansen och skruven medelst rörelse(-er) som företrädevis skiljer sig från vridrörelsen, varvid skruvens skalle frilägges för eventuell efterdragning.

2. Förfarande enligt patentkravet 1, k ä n n e t e c k n a t därav, att för ernående av sammanhållningsfunktion mellan hållare (1), distans (2) och skruv (3) till en gemensam vridfast enhet skruven appliceras i distansen till ett läge där dess skalle (3c) anligger mot distansens fastdragnings- och låsyta

(2d), och sålunda sammanförda distans appliceras i en änduttagning (1e, 1f) i hållaren eller hållaren pressas över distansen och skruven för ernående av den vridfasta funktionen.

3. Förfarande enligt patentkravet 2, k ä n n e t e c k n a t därav, att hållaren arbetar med elastisk och/eller fjädringsfunktion och/eller snäppfunktion, medelst vilken respektive vilka distansen och skruven i sina hopkopplade läge låses till hållaren i vridningsriktningen.

4. Förfarande enligt patentkravet 2, k ä n n e t e c k n a t därav, att distansen under fastskruvningsförloppet medelst skruven bringas i samverkan med implantatets ovanyta (4b) enbart via en ringformad ändyta (2a).

5. Arrangemang med hållare (1) för att till fastväxt implantat (4), företrädesvis i käkben (5), anbringa en distans medelst skruv (3), vars gänguppbärande del (3a) skall sträcka sig genom en urtagning i distansen för att med sin gänga samverka med implantatets gänga (4c) och vars skalle därvid är samverkbar med en fastdragnings- och låsyta i distansen som även uppvisar en med en ovanyta på implantatet samverkbar anliggningsyta (2a), k ä n n e t e c k n a d därav, att hållaren före idragningen av skruven i implantatets gänga uppbär skruven i dess i distansen applicerade och genomförda läge och distansen vridfast med distansens anliggningsyta skjutande utanför hållaren (1) och skruvens gänguppbärande del skjutande utanför anliggningsytan, och att en på så sätt av hållaren, distansen och skruven bildad vridfast enhet är tillförbar implantatet i en samverkningsposition mellan implantatets och skruvens gängor där iskruvning av skruvens gänga i implantatets gänga är effektuerbar medelst

vrid- eller skruvrörelse (8) på enheten, och att hållaren i ett uppkommande iskruvningsläge, företrädesvis där distansens anliggningsyta (2a) samverkar med implantatets ovanyta, är anordnad åtskiljbart från distansen och skruven med isärskiljningsrörelse som företrädesvis skiljer sig från vridrörelsen, varvid skruvens skalle blir frilagd för eventuell vidare- eller efterdragning.

6. Arrangemang enligt patentkravet 5, k ä n n e t e c k n a t därav, att hållaren åtminstone i sin med distansen och skruven samverkbara del (1b) är utförd i plast eller annat elastiskt och/eller fjädringsbart material, och att skruven och distansen i nämnda hopförda läge är applicerbara i en änduttagning (1e, 1f) i nämnda hållardel (1b) som mottar skruven och distansen via inbördes vridrörelser mellan distans, skruv och hållare hindrande funktion, erhållen t.ex. från kläm- eller fjädringsfunktion och/eller styrytor och/eller snäppfunktion, etc.

7. Arrangemang enligt patentkravet 5 eller 6, k ä n n e t e c k n a t därav, att hållaren respektive hållardelen (1b) är försedd med en första urtagning (1f) för skruvens skalle och en andra urtagning (1e) för en eller flera fasthållningsdelar (1g) på distansen, varvid hållaren är påförbar på fasthållningsdelen respektive fasthållningsdelarna och skruvskallen och fasthåller distansen och skruven medelst elasticitet eller fjädring i de första och andra urtagningarnas väggupppbärande material.

8. Arrangemang enligt något av patentkraven 5-7, k ä n n e t e c k n a t därav, att hållaren består av eller innefattar en långsträckt del (1a, 1b) i plast eller motsvarande material.

9. Arrangemang enligt något av patentkraven 5-8, k ä n n e t e c k n a t därav, att hållaren är förhållandevis lätt åtskiljbar från distansen och skruven i dessas i implantatet applicerade eller fastskruvade läge medelst avdragsrörelse som väsentligen sammanfaller med implantatets längdriktning (1h) eller med en vridrörelse som skiljer sig från fastskruvningsrörelsen.

10. Arrangemang enligt något av patentkraven 5-9, k ä n n e t e c k n a t därav, att distansen är försedd med en ringformad anliggningsyta (2a) utan invändiga styrytor, t.ex. styrytor i form av fyr- eller sexkantytor.

11. Arrangemang enligt något av patentkraven 5-10, k ä n n e t e c k n a at därav, att hållaren och dess infästning till distansen och skruven är anordnad att medge en första förankringsanliggning mellan implantatets ovanyta och distansens anliggningsyta som eliminerar risk för lossdragning av implantatet i benet (5), varvid efter hållarens friläggning skruven är idragbar för åstadkommande av en andra förankringsanliggning som är effektuerad med en kraft som väl överstiger kraften för den första förankringsanliggningen.

12. Arrangemang enligt patentkravet 11, k ä n n e t e c k n a t därav, att den andra förankringsanliggningen är effektuerad medelst mothållsfunktion i distansen.

13. Arrangemang enligt något av patentkraven 5-12, k ä n n e t e c k n a t därav, att skruvens gänga är tillverkad i förhållandevis starkt material och/eller är belagd med friktionsreducerande beläggning i syfte

att förbät[illegible] förankringsspänningen [illegible]llan 2001-08-08, skruv och implantat.

14. Arrangemang enligt något av patentkraven 5-13, k ä n n e t e c k n a t därav, att skruvens gängdiameter väsentligt understiger anliggningsytans diameter, och är t.ex. hälften av sistnämnda diameter.

15. Arrangemang enligt patentkravet 14, k ä n n e t e c k n a t därav, att genom val av diametern på skruvgängan och diametern på anliggningsytan och val av lågfriktionsmaterial och/eller lågfriktionsbeläggnings friktionskoefficienten är väsentligt lägre, t.ex. hälften så stor, vid gängan som vid anliggningsytan, vilket medför att säkert mothåll blir appliceringsbart mot distansens utsida vid efterdragning trots frånvaron av mekanisk låsning via verkande låsytor mellan distansen och implantatet.

16. Arrangemang för distans (2) och fastdragningsskruv (3) till implantat (4) för ben, företrädesvis tandben (5), samt hållare till distansen och skruven för att underlätta applicering av distansen och skruven till implantatet, k ä n n e t e c k n a t därav, att hållaren uppbär distansen och skruven vridfast med distansens anliggningsyta (2a) som är avsedd att anligga mot en ovanyta på implantatet skjutande utanför hållaren och med skruven sig genomsträckande distansen och skjutande utanför anliggningsytan med sin gänguppbärande del.

17. Arrangemang enligt patentkravet 16, k ä n n e t e c k n a t därav, att hållaren är utförd med ändurtagning för distansen och skruvens skalle.

18. Arrangemang enligt patentkravet 16 eller 17, k ä n n e t e c k n a t därav, att distansen och

skruvskallen [illegible]tar vridfasta lägen i [illegible]llaren genom att denna är utförd i fjädrande och/eller elastiskt material åtminstone vid nämnda urtagning och hållaren med fjädrande och/eller elastisk funktion samverkar med distansen och skruvskallen.

19. Arrangemang enligt patentkravet 16, 17 eller 18, k ä n n e t e c k n a t därav, att den vridfasta fasthållningen är effektuerad även med snäppfunktion och att t.ex. distansen är utförd med knaster och/eller intagningar (2f, 2g) för nämnda snäppfunktion.

20. Arrangemang enligt något av patentkraven 16-19, k ä n n e t e c k n a t därav, att hållaren i distansens och skruvens applicerade läge på implantatet är särbart från distansen och skruvskallen för längdförskjutningsrörelse i implantatets längdriktning och/ /eller tippningsrörelse.

21. Arrangemang enligt något av patentkraven 16-20, k ä n n e t e c k n a t därav, att hållaren, distansen och skruven bildar en vridfast enhet medelst vilken skruvens gänga är iskruvbar i implantatets gänga medelst skruvrörelser.

22. Användning av hållare (1) för fastsättning i implantat (4) av distans (2) med skruv (3), k ä n n e t e c k n a d därav, att som hållare (1) användes ett långsträckt element som vridfast uppbär distansen och skruven i sammanfört skick och med distansens anliggningsyta (2a) mot implantatets motsvarande anliggningsyta (4b) skjutande utanför hållaren och skruvens gängförsedda del (3a) skjutande utanför anliggningsytan (2a).

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24.02.2000

23. Användning enligt patentkravet [illegible] k ä n n e t e c k n a d därav, att en fjädrande och/eller elastisk del (1b) på hållaren användes för att knipa om och fasthålla distansen och skruven i vridfasta lägen i förhållande till varandra och hållaren.

24. Användning enligt patentkravet 22 eller 23, k ä n n e t e c k n a d därav, att hållaren användes för att överföra manuella vridrörelser till skruven vid dennas iskruvning i implantatet.

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SAMMANDRAG

En distans (2) fastsättes i ett implantat (4) medelst en skruv (3) som sträcker sig genom distansen och vars skalle samverkar med en fastdragnings- och låsyta i distansen. Före idragningen av skruven uppbäres denna och distansen av en hållare som tillsammans med distansen och skruven bildar en vridfast enhet. Skruvens gänga iskruvas i implantatets gänga (4c) medelst vrid- eller skruvrörelser (8) på enheten. Då distans anliggningsyta (2a) under iskruvningen träder i samverkan med en motsvarande ovanyta på implantatet avtages hållaren från distansen och skruven, varefter skruvens skalle frilägges för eventuell vidare- eller efterdragning.

Det föreslås att figur 1 får medfölja sammandraget.

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

To:

Assistant Commissioner for Patents
United States Patent and Trademark Office
Box PCT
Washington, D.C.20231
ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 19 October 2000 (19.10.00)	
International application No. PCT/SE00/00359	**Applicant's or agent's file reference** 4109 PCT
International filing date (day/month/year) 24 February 2000 (24.02.00)	**Priority date** (day/month/year) 18 March 1999 (18.03.99)
Applicant JÖRNEUS, Lars	

1. The designated Office is hereby notified of its election made:

[X] in the demand filed with the International Preliminary Examining Authority on:

12 September 2000 (12.09.00)

[ ] in a notice effecting later election filed with the International Bureau on:

2. The election [X] was

[ ] was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO **34, chemin des Colombettes** **1211 Geneva 20, Switzerland**	Authorized officer R. E. Stoffel
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